



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/IE92/00007</p> <p>(22) International Filing Date: 11 September 1992 (11.09.92)</p> <p>(30) Priority data: 2311/91 11 September 1991 (11.09.91) IE 920,410 7 February 1992 (07.02.92) IE</p> <p>(71) Applicant (for all designated States except US): EOLAS, THE IRISH SCIENCE AND TECHNOLOGY AGENCY [IE/IE]; Glasnevin, Dublin 11 (IE).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): BENNETT, Clayton [IE/IE]; 121 Tritonville Road, Sandymount, Dublin 4 (IE). SULLIVAN, Alan [IE/IE]; 25 Beechpark Avenue, Castleknock, Dublin 15 (IE). SULLIVAN, Paul [IE/IE]; 7 Ashleigh Grove, Castleknock, Dublin 15 (IE).</p>		<p>(74) Agents: O'CONNOR, Donal, H. et al.; Cruickshank &amp; Co., 1 Holles Street, Dublin 2 (IE).</p> <p>(81) Designated States: AT, AU, BB, BG, BR, CA, CH, CS, DE, DK (Utility model), ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, PL, RO, RU, SD, SE, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG).</p> <p>Published With international search report.</p>
<p>(54) Title: A DENTAL FLOSS DEVICE</p> <div data-bbox="592 1144 1185 1764"> </div> <p>(57) Abstract</p> <p>A dental floss device (1, 40, 50, 60, 70) comprises a handle (2) having a shank (3) terminating in a head piece (4). A disposable dental floss holder (5) comprises a base portion (10) and a pair of spaced-apart jaws (11, 12) with a length of dental floss (13) extending therebetween. The head piece (4) has a groove (20) in which the base portion (10) is securely retained when the device is used in all flossing directions. Snap-fit projections (15) extend inwardly from the jaws (11, 12) of the floss holder (5) and are retained behind marginal edges (25) of a floor (24) of the groove (20). When used, the floss holder (5) is removed and a new floss holder (5) is fitted.</p>		

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"A Dental Floss Device"

5 The invention relates to a dental floss device of the type comprising a handle having a head piece, a disposable dental floss holder and releasable engagement means between the head piece and holder for fitting and disposal of the holder.

10 A dental floss device of this type is described in US 3,892,249. The device described in this prior specification comprises a handle having a curved head piece with in-turned jaws which have formations which interengage with complementary formations on a dental floss holder. The holder is of flexible material and is bowed for fitting to the jaws of the head piece and thumb pressure applied.

15 One of the problems with known dental floss devices of this type is that the dental floss holder may be difficult to engage and disengage with the head piece. There is also a substantial risk of the dental floss holder becoming detached from the head piece in use in the mouth.

20 This invention is directed towards providing a dental floss device which will overcome at least some of the problems with known devices.

25 This invention is characterised in that the releasable engagement means on the head piece and holder is arranged to retain the holder securely in position on the head piece during movement of the holder in use in the mesio-distal, bucco-lingual and gingivo-incisal directions.

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5 The advantage of this arrangement is in ensuring that the device may be effectively and safely used in all directions of operation in use. The distal-medial direction refers to the direction across the face of a tooth in a substantially horizontal plane. The bucco-lingual direction refers to the movement interproximally in a substantially horizontal plane. The gingivo-incisal motion refers to the flossing motion in a vertical plane.

10 In one embodiment of the invention the holder comprises a base portion and a pair of spaced-apart jaws extending from the base portion to accommodate a length of dental floss therebetween and the releasable engagement means includes engagement means between the base of the head piece and the holder. This arrangement facilitates the  
15 flossing action in use and ease of manufacture.

The length of floss may be integral with the jaws or may be attached thereto by any suitable means such as adhesives or the like.

20 In a preferred embodiment of the invention the releasable engagement means includes a transversely extending groove on the holder or head piece and a complementary tongue portion on the other of the holder or head piece which interengage an assembly.

25 The provision of a transverse groove and tongue affords particular advantages of strength in use and ease of attachment and disconnection of the holder.

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Preferably the releasable engagement means includes snap-fitting means between the holder and head piece. Snap-fitting engagement in addition to the tongue and groove arrangement provides for ease of attachment and  
5 disconnection while adding to the ability of the connection to resist the forces generated in use.

In one case the snap-fitting means comprises snap-fit projection(s) on one of the holder or head piece which engage with corresponding recess(es) on the other of the  
10 head piece or holder. Preferably for ease of fitting and construction the snap-fit projections and corresponding recesses are provided on the jaws of the holder and adjacent to the groove of the head piece. Typically the  
15 projections extend inwardly from the jaws of the holder to engage with corresponding recesses provided adjacent to the groove of the head piece.

In a particularly preferred embodiment which is preferred for ease of fitting and strength in use the groove is of arcuate shape in longitudinal cross section for  
20 interengagement with a correspondingly shaped tongue portion.

In another embodiment of the invention the snap-fit projections extend from one of the holder or head piece to engage a complementary recess in the other of the holder  
25 or head piece. Typically there are two spaced-apart and oppositely directed snap-fit projections for engagement with a recess provided by a slot. In one case for ease of construction and use the slot is provided in the holder and the snap projections extend from the head piece to  
30 snap-fittingly engage in the slot.

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According to a further embodiment of the invention the head piece includes an additional retaining means for movement between a released position for fitting and removal of the head piece to a locking position substantially enclosing the head piece in the holder. This arrangement leads to a particularly strong construction.

For ease of construction and use the additional retaining means may be hingedly connected, for example, by means of a live hinge, to the head piece.

For additional strength and ease of use the additional retaining means snap-fittingly engages, typically by snap-fit projections on the additional retaining means, with the head piece in the locking position.

In another embodiment of the invention the releasable engagement means comprises a spigot extending from the head piece of the holder to engage with a complementary socket in the other of the holder or head piece.

In a particularly preferred arrangement the socket is provided in the head piece and the spigot extends from the holder to engage the socket.

Preferably the handle includes a shank portion which is inclined in the longitudinal direction at an angle of between 145° and 180° to the handle.

Preferably also the handle includes a shank portion and the head-piece is inclined in the longitudinal direction at an angle of between 125° and 180° to the neck portion.

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The device is most preferably substantially of plastics material. The head piece may be of the same or different plastics material than that of the holder.

5 The invention will be more clearly understood from the following description thereof given by way of example only with reference to the accompanying drawings in which:-

Fig. 1 is a perspective view of a dental floss device according to one embodiment of the invention;

10 Fig. 2 is an exploded view of the dental floss device of Fig. 1;

Fig. 3 is a side view of the device;

Fig. 4 is a cross-sectional view of the device;

Fig. 5 is a diagrammatic view illustrating the operation of the device;

15 Fig. 6 is a perspective view of another dental device according to the invention;

Fig. 7 is an exploded view of the device of Fig. 6;

Fig. 8 is a cross-sectional view of the device of Fig. 6;

20 Fig. 9 is a perspective view of another dental floss device according to the invention;

Fig. 10 is an exploded view of the device of Fig. 9;

Fig. 11 is a partial side cross-sectional view of the device of Fig. 9;

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Fig. 12 is a perspective view of another dental floss device according to the invention;

Fig. 13 is an exploded view of the device of Fig. 12;

5 Fig. 14 is a partial side cross-sectional view of the device of Fig. 12;

Fig. 15 is a perspective view of a further dental floss device according to the invention;

Fig. 16 is an exploded view of the dental floss device of Fig. 15; and

10 Fig. 17 is a cross-sectional view of the device of Fig. 15.

Referring to the drawings and initially to Figs. 1 to 5 thereof there is illustrated a dental floss device according to the invention indicated generally by the  
15 reference numeral 1. The device 1 comprises a handle 2 having a shank portion 3 terminating in a head piece 4. The dental floss device 1 also comprises a disposable dental floss holder 5, the holder 5 and the head piece 4 having releasable engagement means for fitting and  
20 disposal of the holder 5.

The holder 5 comprises a base portion 10 which in this case is of arcuate shape in longitudinal cross section and a pair of spaced-apart jaws 11, 12 extending from the base portion 10 to accommodate a length of dental floss 13  
25 therebetween. The dental floss 13 may be integrally moulded with the holder 5 or may be attached by any suitable means to the holder such as by adhesive bonding.



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The releasable engagement means in this case include snap-fit projections 15 which extend inwardly from the jaws 11, 12 of the holder 5 as will be particularly apparent from Figs. 4 and 2.

5 The head piece 4 of the handle 2 includes a transversely extending groove 20 defined between a pair of upstanding shoulders 21, 22 and a floor 24 of the head piece 4. The groove 20 is of similar shape and dimension to that of the base portion 10 of the holder 5 and the marginal edges 25  
10 of the floor 24 of the groove 20 are rounded to accommodate the snap-fit projections 15 as they ride over the marginal edges 25 of the floor 24 of the groove. At least part of the base portion 10 of the floss holder 4 defines a tongue portion which in use is securely retained  
15 within the groove 20.

In use, the holder 5 is fitted to the head piece by first inserting the head piece 4 through the gap defined between the jaws 11, 12 of the holder 5 and dropping the holder 5 into the groove 20. Light finger pressure is then applied  
20 to the base 10 of the holder 5 to push the snap-projections 15 over the marginal edges 25 of the groove 20 until they engage with the floor 24 of the groove 20 as illustrated in Fig. 4. In this fitted position the holder 5 is positively restrained from movement or deflection in  
25 all positions and directions of use of the dental floss device 1.

Referring particularly to Fig. 5 the various directions of use of the dental floss device are diagrammatically illustrated. The arrows X indicate the bucco-lingual  
30 direction in which the floss 13 is drawn interproximally forward and backwards in the gap between adjacent teeth. The arrows Z indicate the mesio-distal direction which is

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the movement of the floss across the face of the teeth. The arrows Y indicate the gingivo-incisal directions of the cleaning action in a vertical plane Z using the dental floss device.

5 Referring particularly to Fig. 3 it will be appreciated that the handle of the device may be arranged at any suitable angle and may be of any desired shape. For ease of access in use in this case the shank 3 extends at an angle B to the handle 2 of between 145 and 180°. The head  
10 piece 4 is inclined at an angle A to the shank 3 of between 125 and 180°. The particular angle and configuration presents a dental floss device which may be readily used with all teeth in the mouth with minimum discomfort to the user. It will be appreciated that in  
15 the other embodiments described below similar angular configurations may be utilised.

The invention provides a dental floss device which is of simple construction and easy to use. It offers a dental device with holders for dental floss which can be readily  
20 fixed in position and replaced as desired. Because of this simplicity and ease of construction it is anticipated that the device will lead to far more widespread use of dental floss. Because the dental floss holder is easily replaceable and yet retained effectively in position in  
25 all directions of use it is easy and safe to use.

Referring to Figs. 6 to 8 there is illustrated another dental floss device according to the invention indicated generally by the reference numeral 40. The device 40 is similar to the device described above with reference to  
30 Figs. 1 to 4 and like parts are assigned the same reference numerals. In this case the base portion 10 of the dental floss holder 5 and the groove 20 of the head piece 4 are of generally horizontal rather than arcuate

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shape in longitudinal cross section. It is anticipated that this device according to this embodiment of the invention will be slightly cheaper due to less complex moulding requirements.

5 Referring to Figs. 9 to 11 there is illustrated another dental floss device 50 according to the invention. The device 50 is again similar to the device illustrated in Figs. 1 to 5 and like parts are assigned the same reference numerals. In this case the head piece comprises  
10 a channel member having a base 51, a first side web 52a extending from the shank 3 and a second side web 52b which are sized and shaped to receive the base portion 10 of the dental floss holder 5. Additional retaining means 4 for retaining the holder in position is in this case provided  
15 by an extension plate 53 which extends from and is hingedly interconnected by a plastics hinge 55 to the side web 52b. The extension plate 53 has inwardly extending snap-fit projections 56 which engage over the shank 3 of the handle when the plate member 53 is hinged into the  
20 closed or locked position illustrated in Figs. 9 and 11. In the locked position illustrated in Figs. 9 and 11 it will be noted that the base portion 10 of the dental floss holder 5 is completely confined against movement in all directions in use leading to a particularly strong  
25 construction. It will be noted that the side web 52a is extended sidewardly to provide a shoulder to engage part of the jaws 11, 12 of the holder 5 to assist in retaining the holder securely in position. To replace the floss holder 5 the snap projections 56 are released from the  
30 shank 3 of the handle and the extension plate 53 is pushed into the release position illustrated in Fig. 11 allowing the holder 5 to be removed and a fresh holder to be placed in position. For ease of fitting and removal of a holder 5 from the device the hinge 55 may be a live hinge which  
35 biases the snap projections 56 towards the shank 3 and/or

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away from the shank 3 to facilitate insertion and removal of a floss holder 5.

Referring to Figs. 12 to 14 there is illustrated another dental floss holder according to the invention indicated generally by the reference numeral 60. The dental floss holder 60 is similar to the holder illustrated in Figs. 7 to 9 and like parts are assigned the same reference numerals. In this case the groove 20 in the head piece 4 for receiving the floss holder 5 is defined by a base wall 61 and side webs 62a, 62b projecting from the base wall 61, the side webs having in-turned edges 63 to facilitate snap-in of the holder in the head piece. One of the side webs 62 includes a generally L-shaped extension 65 which is hingedly connected to the web 62b by a plastics hinge 66 and has an inwardly extending projection 67 which, in the locked position illustrated in Figs. 10 and 12, enters the gap between the projections 63 to even more positively retain the holder 5 in position on the head piece 4. The device is operated in a similar manner to the device illustrated in Figs. 9 to 11.

Referring to Figs. 15 and 17 there is illustrated another dental floss device according to the invention indicated generally by the reference numeral 70 which is similar to the device described above with reference to Figs. 1 to 5 and like parts are assigned the same reference numerals. In this case the releasable engagement means between the floss holder 5 and head piece 4 comprises a pair of snap-fit projections 71 extending from the base portion 10 of the holder 5 to engage in a complementary socket 72 in the head piece 4. To release the holder 5 a user draws the snap-projections 71 towards each other allowing the projections to move freely through the socket 72. It will be noted that in this case the groove 20 is closed at both

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ends to securely retain the holder 5 in position in the head piece 4.

5 An additional retaining means may be provided for retaining the snap projections 71 splayed in the locked position. The additional retaining means may comprise a spike-like member for insertion between the projections 71. The spike-like member may be attached to the head piece 4 by a hinge arrangement.

10 The dental floss device may be of any suitable material of construction. Preferably the device is of substantially plastics material. The head piece may be of the same or different plastics material than that of the holder.

15 Many variations on the embodiments of the invention described will be readily apparent and accordingly the invention is not limited to the embodiments hereinbefore described which may be varied in both construction and detail.

CLAIMS

1. A dental floss device comprising a handle having a head piece, a disposable dental floss holder and releasable engagement means between the head piece and holder for fitting and disposal of the holder characterised in that
- the releasable engagement means on the head piece and holder is arranged to retain the holder securely in position on the head piece during movement of the holder in use in the mesio-distal, bucco-lingual and gingivo-incisal directions.
2. A dental floss device as claimed in claim 1 wherein the holder comprises a base portion and a pair of spaced-apart jaws extending from the base portion to accommodate a length of dental floss therebetween and the releasable engagement means includes engagement means between the base of the head piece and the holder.
3. A dental floss device as claimed in claim 1 or 2 wherein the releasable engagement means includes a transversely extending groove on the holder or head piece and a complementary tongue portion on the other of the holder or head piece which interengage an assembly.
4. A dental floss holder as claimed in claim 3 wherein the groove is of arcuate shape in longitudinal cross section for interengagement with a correspondingly shaped tongue portion.

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5. A dental floss device as claimed in any of claims 2 to 4 wherein the releasable engagement means includes snap-fitting means between the holder and head piece.
- 5 6. A dental floss device as claimed in claim 5 wherein the snap-fitting means comprises snap-fit projection(s) on the holder or head piece which engage with corresponding recess(es) on the other of the head piece or holder.
- 10 7. A dental floss device as claimed in claim 6 wherein the snap-fit projections and corresponding recesses are provided on the jaws of the holder and adjacent to the groove of the head piece.
- 15 8. A dental floss holder as claimed in claim 7 wherein the projections extend inwardly from the jaws of the holder to engage with corresponding recesses provided adjacent to the groove of the head piece.
- 20 9. A dental floss holder as claimed in any of claims 3 to 5 wherein the snap-fit projections extend from one of the holder or head piece to engage a complementary recess in the other of the holder or head piece.
- 25 10. A dental floss device as claimed in claim 9 wherein there are two spaced-apart and oppositely directed snap-fit projections for engagement with a recess provided by a slot.

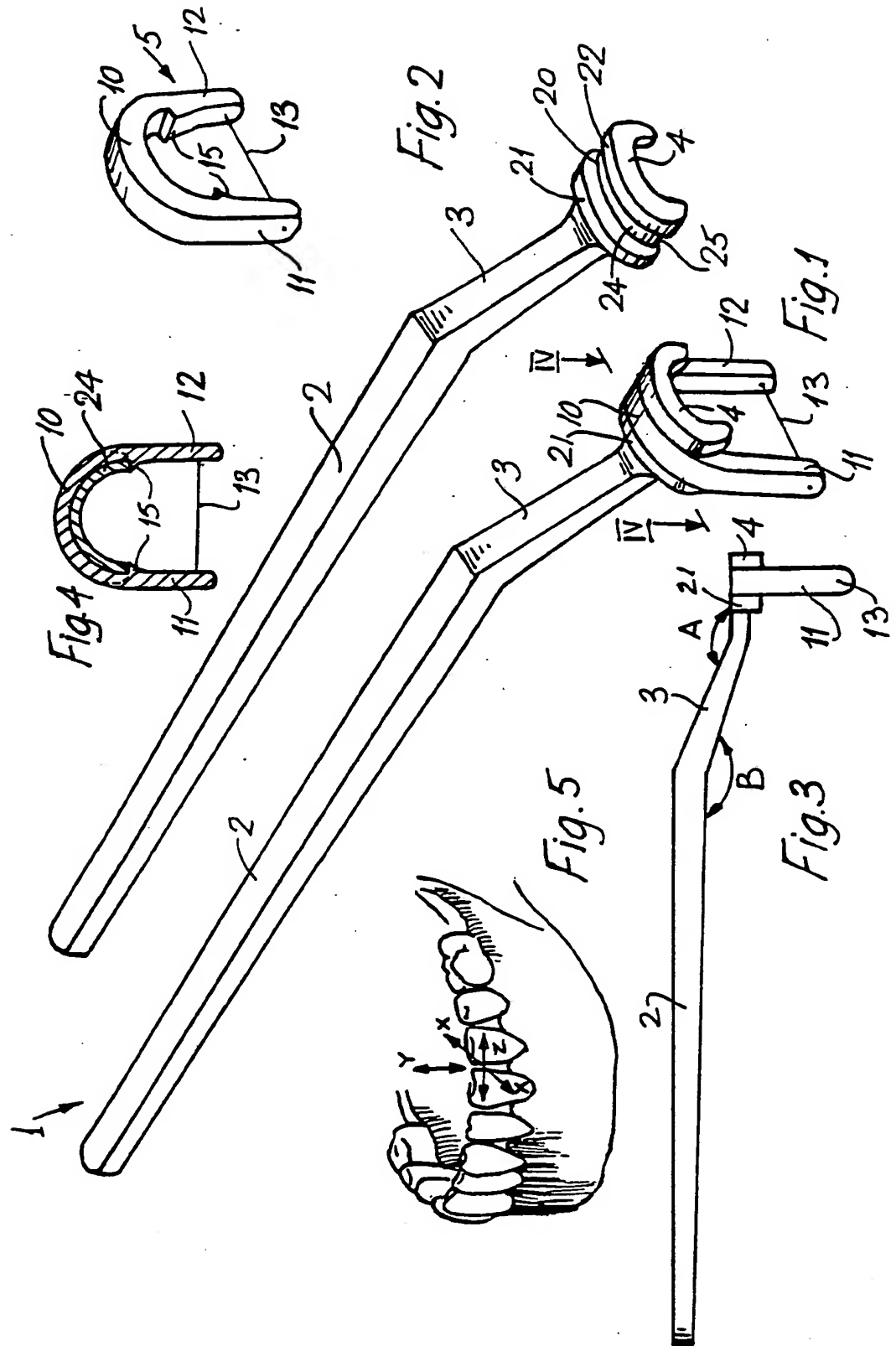
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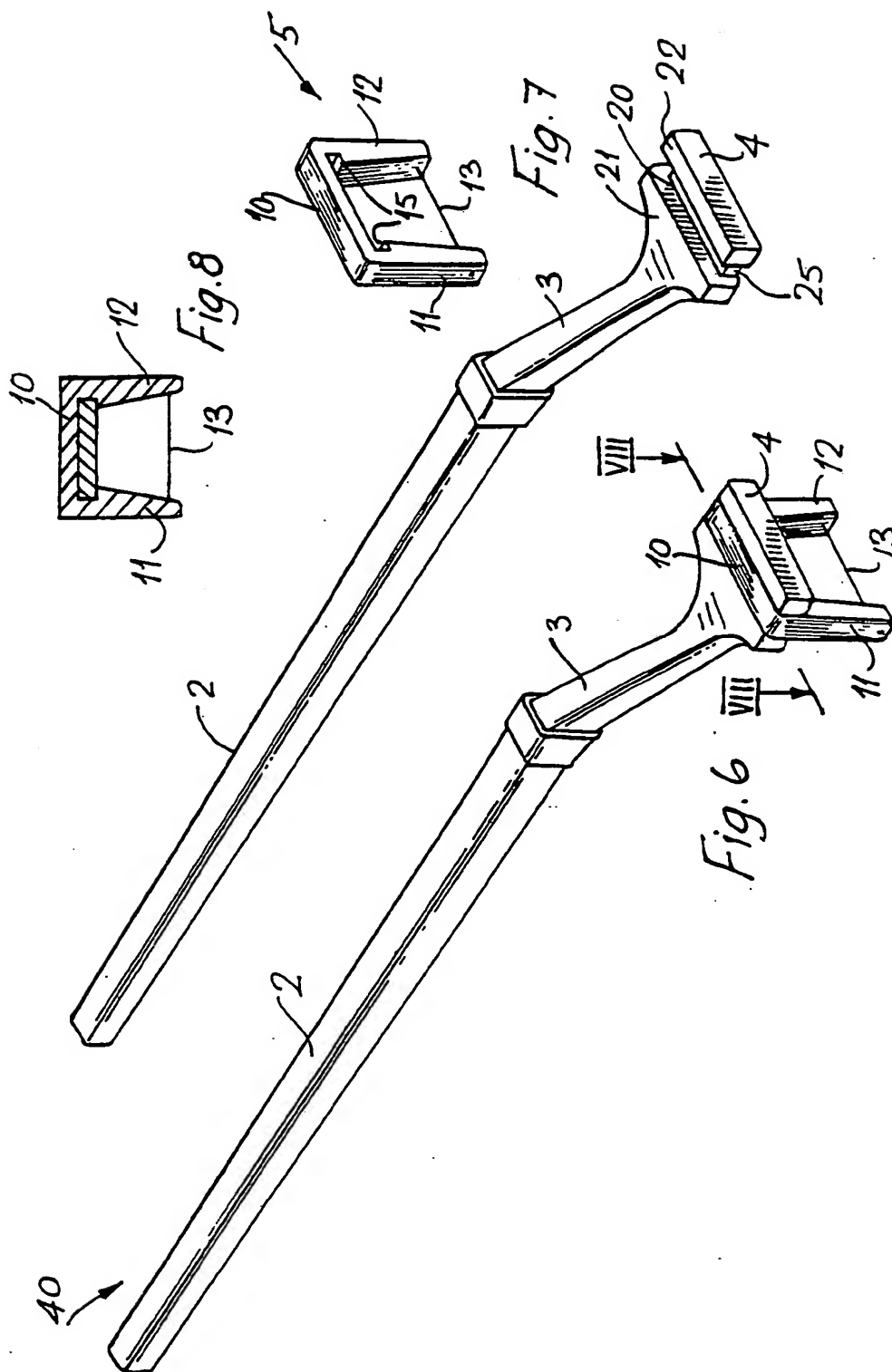
11. A dental floss device as claimed in claim 10 wherein the slot is provided in the holder and the snap projections extend from the head piece to snap-fittingly engage in the slot.
- 5 12. A dental floss device as claimed in any of claims 9 to 11 wherein the transversely extending groove is closed at both ends to securely retain the tongue portion.
- 10 13. A dental floss device as claimed in any preceding claim wherein the head piece includes an additional retaining means for movement between a released position for fitting and removal of the head piece to a locking position substantially enclosing the head piece in the holder.
- 15 14. A dental floss device as claimed in claim 13 wherein the additional retaining means is hingedly connected to the head piece.
- 20 15. A dental floss device as claimed in claim 14 wherein the additional retaining means is hingedly connected to the head piece by a live hinge.
16. A dental floss device as claimed in any of claims 13 to 15 wherein the additional retaining means snap-fittingly engages with the head piece in the locking position.
- 25 17. A dental floss device as claimed in claim 16 wherein the additional retaining means is provided with snap-fit projections which engage with the head piece in the locking position.

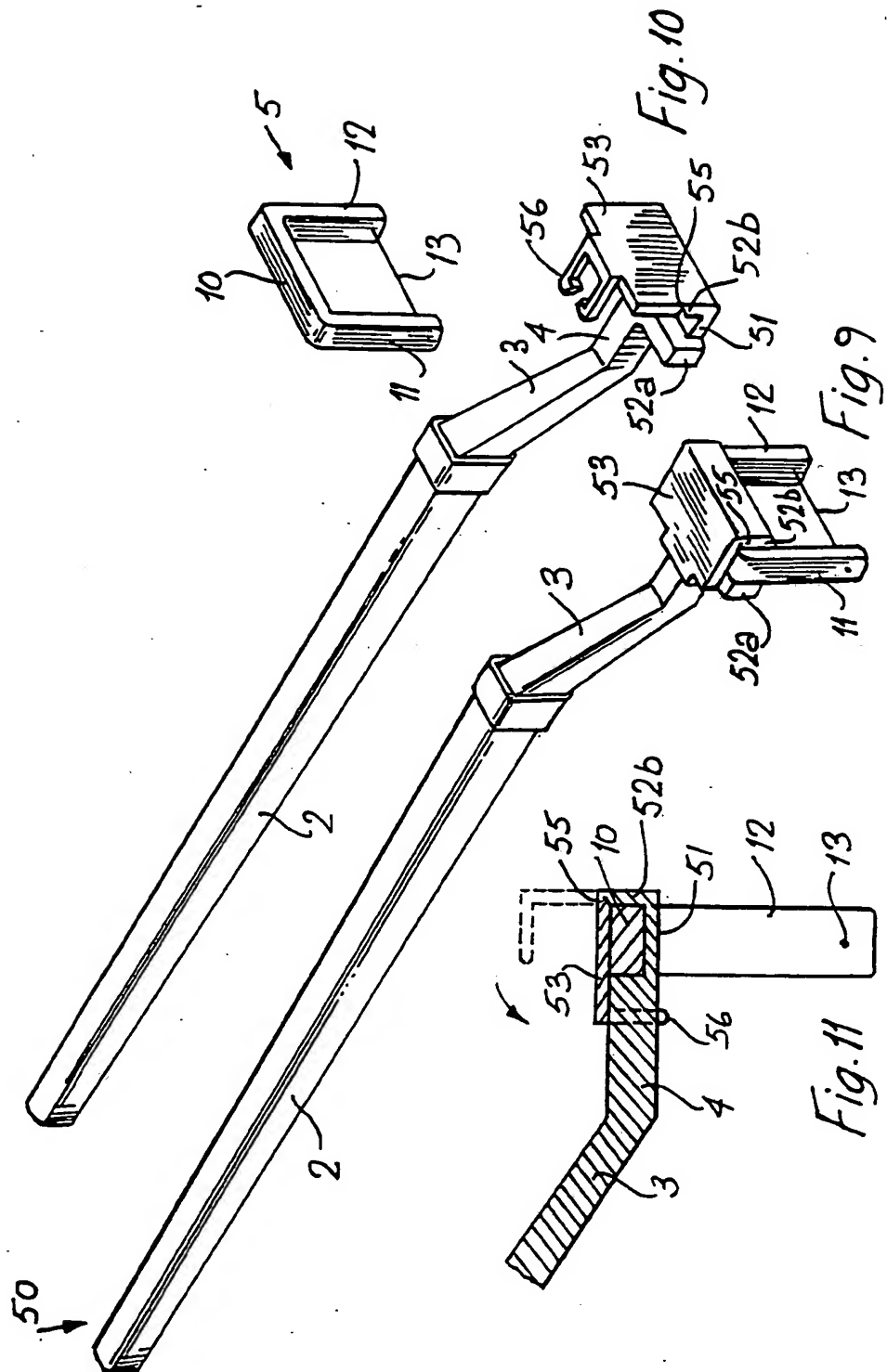


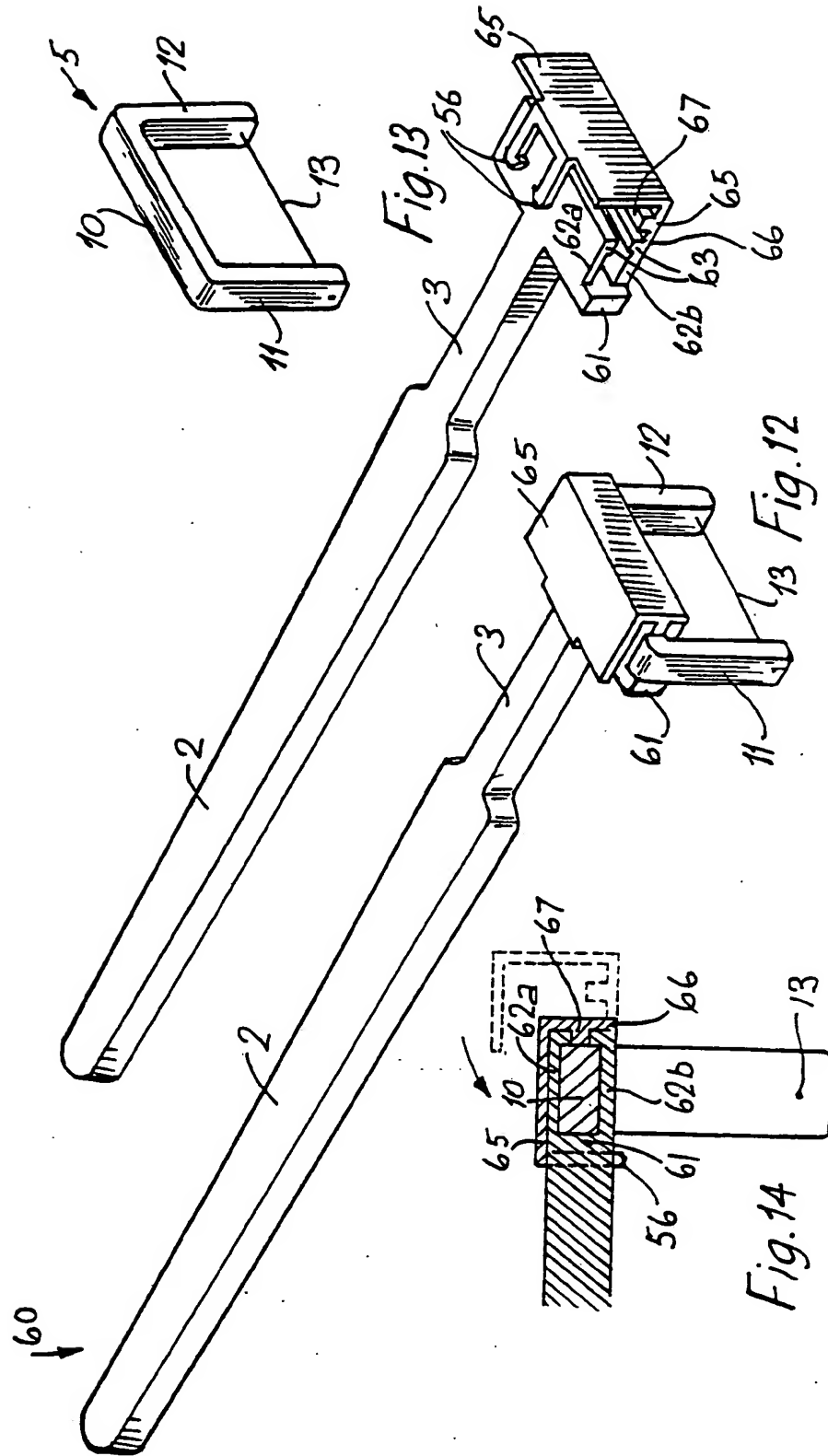
- 15 -

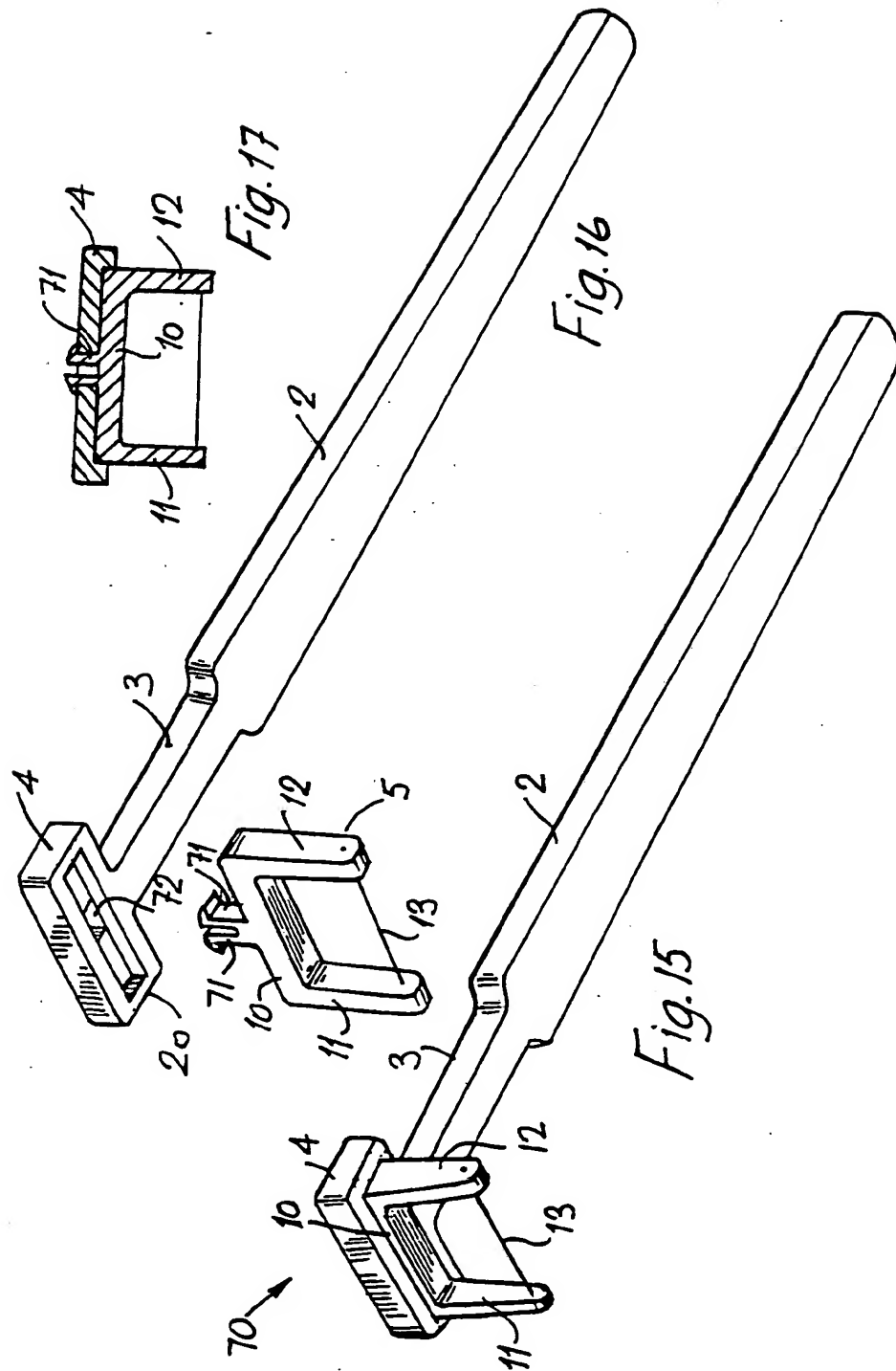
18. A dental floss device as claimed in any preceding claim wherein handle includes a shank portion which is inclined in the longitudinal direction at an angle of between 145° and 180° to the handle.
- 5 19. A dental floss device as claimed in any preceding claim wherein the handle includes a shank portion and the head-piece is inclined in the longitudinal direction at an angle of between 125° and 180° to the neck portion.
- 10 20. A dental floss device as claimed in any preceding claim wherein the device is substantially of plastics material.
21. A dental floss device as claimed in claim 20 wherein the head piece is of the same plastics material as that of the holder.
- 15 22. A dental floss device as claimed in claim 20 wherein at least portion of the holder is of a different plastics material than that of the head piece.
- 20 23. A dental floss device substantially as hereinbefore described with reference to the accompanying drawings.











## INTERNATIONAL SEARCH REPORT

International Application

PCT/IE 92/00007

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC		
Int.Cl. 5 A61C15/04		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl. 5	A61C ; B25G	
Documentation Searched other than Minimum Documentation to the extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	FR,A,2 450 579 (PAYEN) 3 October 1980 see page 3, line 17 - line 25; figures 12,13	1-6,9,13
X	US,A,3 892 249 (JONES) 1 July 1975 cited in the application see the whole document	1-12, 20-23
X	DE,U,8 708 369 (SAUREN) 22 October 1987  see the whole document	1-6,9, 18,16, 20-23
X	US,A,2 187 899 (HENNE) 23 January 1940 see column 2, line 22 - line 48; figures 3,4	1-7,12
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<div style="display: flex; justify-content: space-between;"> <div> <p><sup>10</sup> Special categories of cited documents : <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p> </div> </div>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
30 .NOVEMBER 1992	0 4. 12. 92	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	VANRUNXT J.	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
X	WO,A,8 502 533 (HUYNH) 20 June 1985 see the whole document ---	1,2,5,6, 9,20-23
A	DE,C,173 899 (LIESKAR) 22 November 1905 see the whole document -----	13,14, 16,17



**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.**

IE 9200007  
SA 64185

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
The members are as contained in the European Patent Office EDP file on  
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
FR-A-2450579	03-10-80	None	
US-A-3892249	01-07-75	None	
DE-U-8708369	10-09-87	None	
US-A-2187899		None	
WO-A-8502533	20-06-85	AU-A- 3784285 EP-A- 0169216	26-06-85 29-01-86
DE-C-173899		None	